CLAIMS

1. An electric power plant, comprising at least one rotating electric machine, intended to be connected directly to a distribution or transmission network and comprising at least one electric winding, **characterized** in that the winding comprises at least one electric conductor, a first layer with semiconducting properties surrounding the conductor, an insulating layer surrounding the first layer, and a second layer with semiconducting properties surrounding the insulating layer, and in that a brushless excitation system is adapted to excite the electric machine.

2. A power plant according to claim 1, **characterized** in that the potential of the first layer is essentially equal to the potential of the conductor.

3. A power plant according to claim 1 or 2, **characterized** in that the second layer is adapted to form essentially an equipotential surface surrounding the conductor.

4. A power plant according to claim 3, **characterized** in that the second layer is connected to a predetermined potential.

5. A power plant according to claim 4, **characterized** in that said predetermined potential is ground potential.

6. A power plant according to any of the preceding claims, **characterized** in that at least two adjacent layers of the winding of the machine have essentially equal coefficients of thermal expansion.

7. A power plant according to any of the preceding claims, **characterized** in that the conductor comprises a number of strands, at least some of which being in electrical contact with one another.

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8. A power plant according to any of the preceding claims, **characterized** in that each one of said three layers is fixed to adjacent layers along essentially the whole contact surface.

9. A power plant according to any of the preceding claims, **characterized** in that said layers are adapted to adhere to one another even when the insulated conductor is bent.

10. An electric power plant, comprising at least one rotating electric machine of alternating-current type, intended to be connected directly to a distribution or transmission network and comprising at least one magnetic core and at least one electric winding, **characterized** in that the winding is formed from a cable comprising one or more current-carrying conductors, each conductor having a number of strands, an inner semiconducting layer arranged around each conductor, an insulating layer of solid insulating material arranged around said inner semiconducting layer, and an outer semiconducting layer arranged around the insulating layer, and in that a brushless excitation system is adapted to excite the electric machine.

11. A power plant according to claim 10, **characterized** in that said cable comprises a sheath.

12. A power plant according to any of the preceding claims, **characterized** in that the brushless excitation system comprises a rotating part with an exciter, connected to controllable semiconductor elements with associated control equipment for rectifying the supply voltage obtained for supplying the field winding of the machine.

13. A power plant according to claim 12, **characterized** in that a communication unit is adapted for wireless communication between stationary regulator equipment and the control equipment included in the rotating part.

14. A power plant according to claim 12 or 13, **characterized** in that the exciter is of synchronous machine type with a rotating stator winding.

15. A power plant according to claim 12 or 13, **characterized** in that the exciter comprises a permanent-magnet generator, in which stationary permanent magnets are supplemented by winding turns for controlled changes of the flux.

16. A power plant according to claim 12 or 13, **characterized** in that the exciter comprises an asynchronous machine with three rotating windings and reversed direction of rotation.

17. A power plant according to any of claims 12 - 16, comprising a machine for auxiliary power generation, **characterized** in that the exciter is designed with double stator windings for supplying the electric machine or the main machine as well as the auxiliary power machine.

18. A power plant according to claim 17, **characterized** in that the stator windings are connected to each of their respective controllable semiconductor elements with respective control equipment for individual control of the supply of the auxiliary power machine and the electric machine.

19. A power plant according to claim 17 or 18, **characterized** in that the control equipments are adapted to generate control pulses to the controllable semiconductor elements in a manner self-compensating for variations in the supply voltage to the semiconductor elements.

20. A power plant according to any of claims 12-19, **characterized** in that the controllable semiconductor elements are adapted to form a thyristor bridge.

21. A power plant according to any of claims 12-20, **characterized** in that a filter transformer is adapted to determine the phase position for firing the controllable semiconductor elements for adaptation of the voltage.

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22. A power plant according to any of claims 13-21, **characterized** in that the communication unit comprises stationary transmitters and/or receivers connected to the regulator equipment as well as receivers and/or transmitters on the rotating part connected to the control equipment for communication therebetween with frequency-modulated infrared light.

23. A power plant according to any of claims 17-22, **characterized** in that the auxiliary power machine is adapted, via the converter, to supply the stationary field winding of the rotating exciter.

24. A power plant according to any of claims 17-23, **characterized** in that the output voltage of the auxiliary power machine is fed back, via a regulator, to the controllable semiconductor elements for the auxiliary power machine for regulating the voltage by excitation control.

25. A power plant according to any of claims 13-24, **characterized** in that the stationary part and the rotating part of the communication unit are adapted for wireless communication, capacitively or inductively or by radio communication or optical connection.

26. A power plant according to any of the preceding claims, **characterized** in that a unit is adapted to detect ground faults in the supply of the field winding of the electric machine.

27. A power plant according to any of the preceding claims, **characterized** in that transducers are adapted to measure the temperature in the field winding of the electric machine.

28. A power plant according to any of claims 12-27, **characterized** in that an overvoltage protection device, controlled by the control equipment, is connected across the field winding of the electric machine.

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29. A power plant according to claim 28, **characterized** in that current-measuring means are arranged on the AC and DC sides of the controllable semiconductor elements, and that the overvoltage protection device is adapted to be reset in response to the difference between these currents fulfilling a predetermined condition.

30. A power plant according to any of claims 13-29, **characterized** in that the output voltage of the electric machine is fed back to the regulator equipment for adaptation of the supply voltage to the actual operating conditions.

31. A power plant according to any of claims 17-30, **characterized** in that the auxiliary power machine comprises at least one electric winding with at least one electric conductor, a first layer with semiconducting properties surrounding the conductor, an insulating layer surrounding the first layer, and a second layer surrounding the insulating layer.

32. Use of a rotating electric machine in an electric power plant according to any of the preceding claims, said machine being intended to be connected directly to a distribution or transmission network and comprising at least one electric winding, said winding comprising at least one electric conductor, a first layer with semiconducting properties surrounding the conductor, an insulating layer surrounding the first layer, and a second layer with semiconducting properties surrounding the insulating layer, and a brushless excitation system for exciting the electric machine.